

City of Houston

Design Manual

STANDARD SPECIFICATIONS

Section 02763

**PREFORMED DURABLE PAVEMENT
MARKING AND REFLECTORIZED PAINT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Durable retroreflective preformed pavement markings.
- B. ReflectORIZED paint for median nose and curb.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

- 1. Payment for linear pavement markings is on a linear foot basis for each class and width, measured in place.
- 2. Payment for words and symbols is for each word or symbol.
- 3. Payment for railroad crossing markings, to include stop line and two transverse lines, is for each crossing marked.
 - a. For multi-lane approaches to railroad crossings, the solid 8-inch lane lines will be measured in linear feet, complete in place.
- 4. Payment for reflectORIZED paint is on a linear foot basis for each height and width of curb, measured in place.
- 5. Refer to Section 01270 - Measurement and Payment for unit price procedures.

- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

- A. ASTM D 638 - Test Method for Tensile Properties of Plastics.
- B. ASTM D 4061 - Test Method for Flexible Cellular Materials Sponge or Expanded Materials.
- C. ASTM E 97 - Test Method for 45 - Degree, 0 Degree Directional Reflectance Factor of Opaque Specimens by Broad Beam Filter.

- D. ASTM E 303 - Method of Measuring Surface Frictional Properties Using the British Pendulum Tester.
- E. TxDOT - Texas Manual on Uniform Traffic Control Devices for Streets and Highways.

1.04 DURABLE PAVEMENT MARKING DEFINITIONS

- A. Class I - Preformed pavement markings suitable for longitudinal and word and symbol markings on roadways with high volume traffic.
- B. Class II - Preformed patterned pavement markings with minimum retained retroreflectivity, suitable for longitudinal and word and symbol markings on roadways with high volume traffic.
- C. Class III - Preformed pavement markings designed for use with liquid contact cement as words, symbols, lane lines, edge lines, channelizing lines, stop bars, and crosswalks on roadways with low to moderate volume traffic and low shear areas.
- D. Class IV - Preformed pavement markings with durable urethane topcoat suitable for word, symbols, crosswalks and stop bars on roadways with high volume traffic and in areas of high shear or abrasion.
- E. Class V - Preformed pavement markings suitable for longitudinal overlay markings on roadways with moderate, well channelized, free rolling traffic.

1.05 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit manufacturer's product data for each proposed class of marking material; primers, solvents, and adhesives; and installation instructions; for approval. Include certificate by manufacturer that each class of marking conforms to the requirements of this specification.
- C. Submit details of manufacturers replacement policy for each class of marking material.

1.06 DELIVERY AND STORAGE

- A. Deliver preformed plastic marking material in rolls or strips. Deliver words and symbols in precut convenient sizes to provide for ease in application. Ship word and symbol markers with easily removable protective liners.
- B. Store material in cool dry conditions until application.

PART 2 PRODUCTS

2.01 PREFORMED MARKINGS AND PAINTS

- A. Retroreflective Preformed Markings: White or yellow polymeric films with pigments conforming to standard highway colors. Glass beads shall be incorporated in film to provide immediate and continuing retroreflection.
- B. ReflectORIZED Paint for Curb: White or yellow conforming to the requirements of Federal Specifications TT-P-87, or equal, and applied according to the manufacturer's specifications.
- C. Quality performance characteristics shall be as given in Table 02763-1, Performance Characteristics of Preformed Durable Pavement Marking, located at the end of this Section.

2.02 ADHESIVES AND SOLVENTS

- A. Film shall be pre-coated with pressure sensitive adhesive capable of bonding markings to Portland cement concrete and asphaltic concrete pavements.
- B. Manufacturer shall identify suitable solvents or primers necessary for proper preconditioning pavements prior to application.

2.03 FABRICATION

- A. Manufacture markings to conform to color, shape, and size requirements of TxDOT, Texas Manual on Uniform Traffic Control Devices for Streets and Highways.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prepare pavement surfaces and install markings in accordance with manufacturer's recommendations.
- B. Accurately locate and install approved markings to conform to classes, colors, lengths, widths, and configurations indicated on Drawings. In pavement restoration areas, continue longitudinal markings to nearest intersecting streets or as approved by the City Engineer.
- C. Apply line markings with a mechanical applicator capable of applying pavement lines in a neat, accurate, and uniform manner. Applicator shall be equipped with a film cut-off device. Apply words and symbols by hand so as to attain neat, accurate, and uniform results.
- D. Clean and repair surfaces to receive markings. Blast clean surfaces indicated on Drawings or where directed by City Engineer in accordance with requirements of Section 02762- Blast

Cleaning of Pavement. Do not clean Portland cement concrete pavements by grinding.

3.02 INLAID INSTALLATION ON ASPHALTIC CONCRETE PAVEMENTS

- A. This installation procedure applies to streets with new asphaltic concrete surfacing.
- B. Apply markings on newly placed compacted pavement having a temperature of between 125 to 155 degrees F and prior to final rolling.
- C. Inlay markings with a mechanical roller of sufficient weight to imbed preformed markers to a minimum depth of 60 percent and a maximum depth of 80 percent of material thickness. Roll while temperature of pavement is in a 125 to 155 degree F range.

3.03 SURFACE INSTALLATION

- A. This installation procedure applies to asphaltic concrete transition sections and streets with Portland cement concrete surfacing.
- B. Test pavement surface for moisture content prior to application of markings. Place an approximate 2 square foot sheet of clear plastic or tar paper on road surface and hold in place for 20 minutes. Immediately inspect the sheet for build up of condensed moisture. If sufficient moisture has condensed to cause water to drip from sheet, do not apply markings. Repeat test as necessary until adequate moisture has evaporated from pavement to allow placement.
- C. Observe manufacturer's recommended pavement and ambient air temperature requirements for application. If manufacturer has no temperature recommendations, do not install markings if pavement temperature is below 60 degrees F or above 120 degrees F.
- D. Prime pavement surface and apply markings as recommended by manufacturer.

3.04 FIELD QUALITY CONTROL

- A. Pavement markings shall present a neat, uniform appearance and shall be free of unsightly spread of excess adhesive. Markings shall be free of ragged edges and misshaped lines or contours.
- B. Markings shall adhere to pavement sufficiently to prevent lifting, shifting, smearing, spreading, flowing or tearing by traffic.
- C. Repair or replace improperly installed markers at no additional cost to the City.

3.05 CLEANING

- A. Keep project site free of unnecessary traffic hazards at all times.
- B. Clean area upon completion of work and remove rubbish from work site.

3.06 WARRANTY

- A. Contractor shall warrant material and labor for a period of 12 months from date of installation of markings. Immediately upon notification, replace portions of pavement marking lines or legends that have lifted, shifted or spread, lost daytime color, or nighttime retroreflectivity.

END OF SECTION

Table 02763-1
PERFORMANCE CHARACTERISTICS OF PREFORMED DURABLE PAVEMENT MARKINGS

		CLASS I		CLASS II		CLASS III		CLASS IV		CLASS V		TEST METHOD
		White	Yellow	White	Yellow	White	Yellow	White	Yellow	White	Yellow	
1.	Thickness without adhesive, mils, min.	60		65 (Peak) 20 (Valley)		60		60		12		Caliper Gauge
2.	Refractive index of beads, min.	--		1.5 Rubber 1.7 Surface*		1.5		1.5 & 1.9		1.7		Liquid Oil Immersion
3.	Init. retroreflectance (mcd. ft ⁻² . fc ⁻¹), min. ** @ 86.0°, 0.2° ** @ 86.5°, 1.0°	550 300	410 175	1100 700	800 500	550 300	410 175	700 400	500 300	960 650	680 470	ASTM D 4061
4.	Retained retroreflectance (mcd. ft ⁻² . fc ⁻¹), min. ** @ 86.5°, 1.0°	--	--	100		--	--	--	--	--	--	ASTM D 4061
5.	Init. skid resistance (avg.) -BPN	45		45		45		50		45		ASTM E 303
6.	Tensile strength (psi) min.	150		20		150		100		--	--	ASTM D 638***
7.	Percent elongation at break, min.	75		20		75		50		--	--	ASTM D 638***
8.	Daytime reflectance factor "Y" %, min.	65	36	65	36	65	36	65	36	65	36	ASTM E 97

- * Tough Ceramic Beads.
 ** (Entrance Angle, Observation Angle).
 *** Crosshead speed of 10-12 inches per minute when tested with a gap of 4 inches between jaws and 1" X 6" sample.

Section 02951

PAVEMENT REPAIR AND RESURFACING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Repairing and resurfacing streets, highways, driveways, sidewalks, and other pavements that have been cut, broken, or otherwise damaged during construction.

1.02 MEASUREMENT AND PAYMENT

- A. Unit Prices.
 - 1. No separate payment will be made for pavement repair and resurfacing under this Section. Include payment in unit price for work in appropriate sections.
 - 2. Refer to Section 01270 - Measurement and Payment for other unit price procedures.
- B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this section is included in the total Stipulated Price.

1.02 DEFINITIONS

- A. Five-Year CIP - Street improvement projects included in a Capital Improvement Program by the City of Houston, Harris County, METRO, TxDOT, or other organization for construction.
- B. Hole - Excavation in the pavement with the excavation having a length less than the width of the pavement.
- C. Patch - Method of pavement replacement that is temporary in nature. A patch consists of the compaction of the subbase and aggregate base, and the replacement, in kind, of the existing pavement for a minimum of two feet beyond the edges of the excavation in all directions.
- D. Trench - An excavation in the pavement with the excavation having a length equal to or greater than the width of the pavement.
- E. Two-year CIP - Street improvement projects included in a Capital Improvement Program by the City of Houston, Harris County, METRO, TxDOT, or other organization for construction.

PART 2 P R O D U C T S

2.01 MATERIALS

- A. Subgrade:
 - 1. Provide backfill material as required by applicable excavation and fill sections (Sections 02315 through 02319) and Section 02330 - Embankment.
 - 2. Provide material for stabilization as required by applicable portions of Section 02336 - Lime Stabilized Subgrade, Section 02337 - Lime/Fly-Ash Stabilized Subgrade, and Section 02338 - Portland Cement Stabilized Subgrade.
- B. Base: Provide base material as required by applicable portions of Section 02711 - Hot Mix Asphaltic Base Course, Section 02712 - Cement Stabilized Base Course, and Section 02713 - Crushed Concrete Base Course.
- C. Pavement: Provide paving materials as required by applicable portions of Section 02741 - Asphaltic Concrete Pavement, Section 02751 - Concrete Paving, Section 02754 - Concrete Driveways, and Section 02771 - Curb, Curb and Gutter, and Headers, and Section 02775 - Concrete Sidewalks.

PART 3 E X E C U T I O N

3.01 PREPARATION

- A. Obtain Street Cut Permit and notify City Engineer 72 hours before commencement of construction operations.
- B. Conform to requirement of Section 02221 - Removing Existing Pavements and Structures, for removals.
- C. Saw cut pavement 18 inches wider than width of trench needed to install utilities unless otherwise indicated on Drawings.
- D. Protect edges of existing pavement to remain from damage during removals, utility placement, backfill, and paving operations. For concrete pavement, leave and protect minimum of 18 inches of undisturbed subgrade on each side of trench to support replacement slab.

3.02 INSTALLATION

- A. Parking Areas, Service Drives, Driveways, and Sidewalks: Replace with material equal to or better than existing or as indicated on Drawings and City of Houston Standard Detail 02951.01. Conform to applicable requirements of sections referenced in Paragraph 2.01, Materials.
- B. Street Pavements and Curbs, Curbs and Gutters: Replace subgrade, base, and surface course with like materials or as indicated on Drawings and City of Houston Standard Detail 02951.01. Curbs and curbs and gutters shall match existing. Conform to requirements of sections referenced in Paragraph 2.01, Materials.
- C. For concrete pavement, install size and length of reinforcing steel and pavement thickness indicated on Drawings and City of Houston Standard Detail 02951.01. Place types and spacing of joints to match existing or as indicated on Drawings.
- D. Where existing pavement consists of concrete pavement with asphaltic surfacing, resurface with minimum 2-inch depth asphaltic pavement.
- E. Repair State highway crossings in accordance with TxDOT permit and within 1 week after utility work is installed.

3.03 WASTE MATERIAL DISPOSAL

- A. Dispose of waste material in accordance with requirements of Section 01576 - Waste Material Disposal.

3.04 PROTECTION

- A. Maintain pavement in good condition until completion of the Work.
- B. Replace damaged pavement.

END OF SECTION